

Our Ref: 1850

3 September 2015

Xiamen Antai New Energy Tech. Co., Ltd.  
Room 402, No.21 Wanghai Road, Software Park II  
Siming District, Xiamen, China 361008

### Array Frame Engineering Certificate

#### **Installation of flush mounted solar array frame on Tile Roof**

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of the Xiamen Antai New Energy Tech. Co., Ltd. solar flush mount frame for the use within Australia. The design check has been based on the information provided by Xiamen Antai New Energy Tech. Co., Ltd.

We find the Installation of flush mounted solar array frame on tile roof to be structurally sufficient for Australian use based on the following conditions:

- Wind Loads to AS/NZ1170.2:2011 Admt 3-2012
- Wind Region A, B, C, D
- Wind Terrain Category 2 & 3
- Wind average recurrence interval of 100 years region A and B
- Wind average recurrence interval of 500 years region C and D
- Maximum Building height 20 m
- Timber with Joint Type classification J5 and J6 are excluded unless tested for Screw capacity
- PV panels to be installed flat on the roof
- Max. Solar Panel Dimensions 2000×1000
- Regional Wind speed:

Wind Zone	A	B	C	D
Wind Speed (m/s)	41	48	69	88

#### ***Refer to attached summary table for interface spacing.***

Construction is to be carried out strictly in accordance with the manufacturers instructions. This work was designed in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles.

Yours faithfully,  
Gamcorp (Melbourne) Pty Ltd



Martin Gamble  
Managing Director  
MAICD



Milan Bjelobrk  
MIEAust, CPEng, NPER 2210984,  
RPEQ 12090, RBP EC-38461, NT BPB 139671ES

## Structural Design Documentation

### **Solar Roof Interface Spacing Table** **According to AS/NZS 1170.2-2011 Amdt 3-2012** **Within Australia** **Terrain Category 2**

For: Xiamen Antai New Energy Tech. Co., Ltd.



Job Number: 1850

Date: September 3, 2015

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Certificate Nc

**Job No: 1850**

**Client: Xiamen Antai New Energy Tech. Co., Ltd.**

**Project: Solar Roof Interface Spacing Table**

**Address: Within Australia**

**Australian Standards**

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

AS 1664.1 – Aluminium structures - Limit state design

**Wind Terrain Category:**

WTC 2

**Designed: B.C**

**Date: Sep-15**

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **Solar Array Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1850**  
 Date: **Sep-15**

**Solar Array Interface spacing Table for Tile Roof**

Type of Rail: Rail II  
 Type of Interface: ATL-FWNY-05  
 Solar Panel Dimension: 2mx1m  
 Terrain category: 2

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Middle	D.W & U.W	Middle	D.W & U.W	Middle		
A	794	978	716	881	674	829		
B	569	698	514	630	485	594		
C	266	325	241	294	228	278		
D	168	204	152	185	143	175		

Roof Angle ( $\Phi$ ) -  $5^\circ \leq \Phi \leq 30$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Middle	D.W & U.W	Middle	D.W & U.W	Middle		
A	794	1158	716	1040	674	979		
B	569	823	514	741	485	698		
C	266	381	241	344	228	325		
D	168	239	152	216	143	204		

Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **Solar Array Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1850**  
 Date: **Sep-15**

**Solar Array Interface spacing Table for Tile Roof**

Type of Rail Rail III  
 Type of Interface ATL-FWNY-05  
 Solar Panel Dimension 2mx1m  
 Terrain category 2

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H $\leq$ 10		10<H $\leq$ 15		15<H $\leq$ 20			
	D.W & U.W	Middle		D.W & U.W	Middle		D.W & U.W	Middle
A	794	978		716	881		674	829
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**Solar Array Interface spacing Table for Tile Roof**

Type of Rail Rail IV  
 Type of Interface ATL-FWNY-05  
 Solar Panel Dimension 2mx1m

Terrain category 2

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

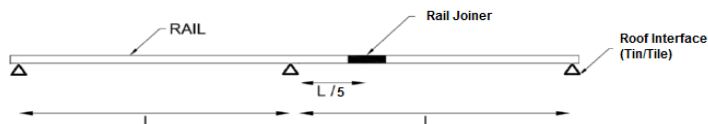
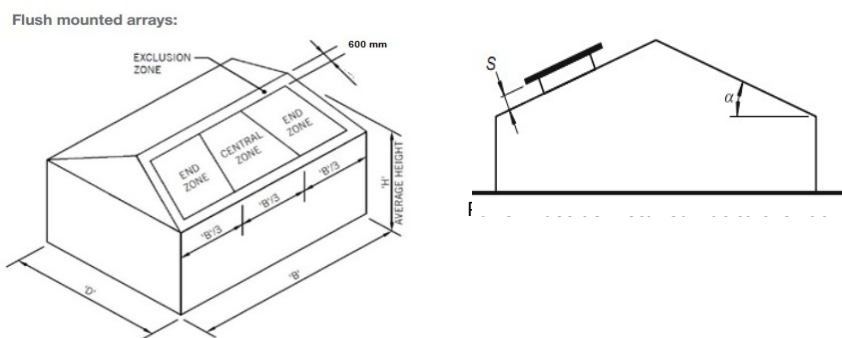
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	D.W & U.W	Middle		D.W & U.W	Middle		D.W & U.W	Middle
A	794	978		716	881		674	829
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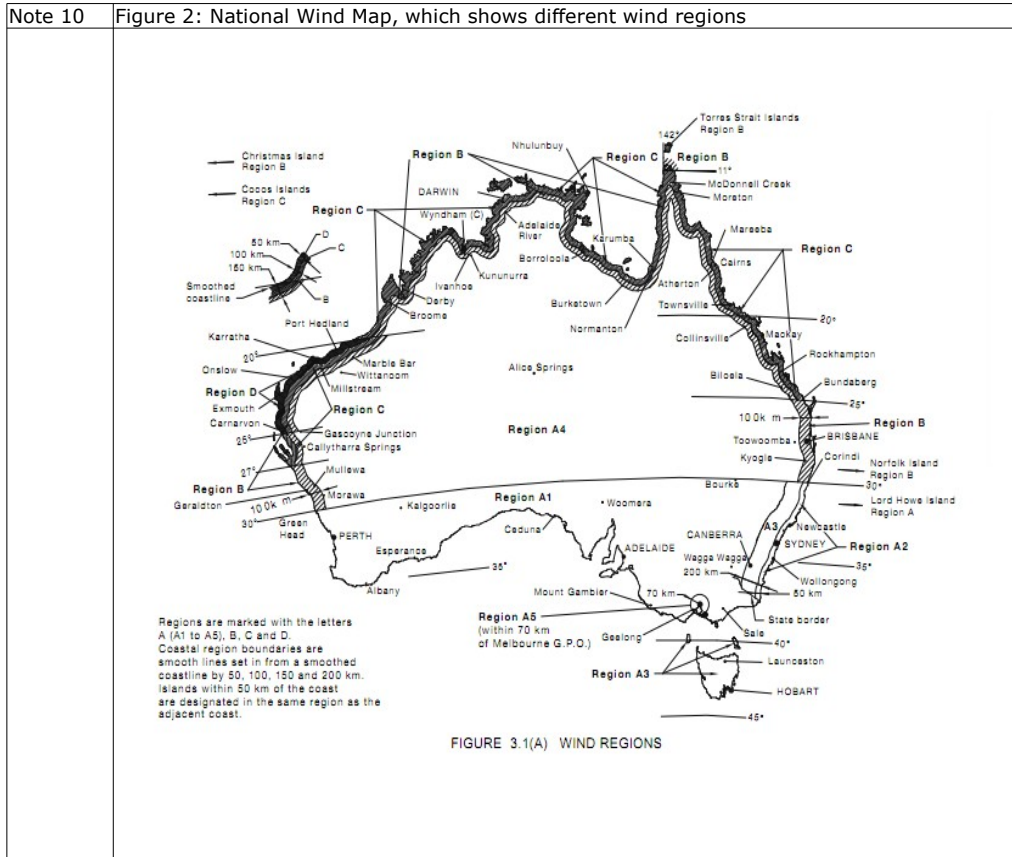
Client: **Xiamen Antai New Energy Tech. Co., Ltd.**  
 Project: **Solar Array Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1850**  
 Date: **Sep-15**

<b>General Notes</b>		
Note 1	All holes must be pre drilled, with minimum screw embedment of 38 mm into timber.	
Note 2	The width of timber purlins shall not be less than 38mm. Use minimum of two screws per tile hook	
Note 3	Recommended screws <b>Wood purlins and Rafter</b> Pine and Hardwood (38mm embedment and above)	<b>Fasteners to use</b> 14g 10 TPI (6.3 x 65 mm long)
Note 4	Roof Tile Hook must be fixed with minimum of three 14g 10 TPI	
Note 5	Following components are satisfied to use according to AS1170.2011	
	<b>Components</b>	<b>Part Number</b> <b>Description</b>
	L foot	ATL-TYN-hook01      Tile Hook Roof Interface
	Inter Clamp	ATL-FWNY-09      Internal fixing between rail and solar panel
	End Clamp	ALT-TYN-14      End fixing between rail and solar panel
	Splice	ATL-TYN-21      Rail Connection
	Antai Rail II	ATL-TYN-28      Aluminium Rail (AL6005-T5)
	T Module	ATL-TYN-29      Rail to bolt connector
	Antai Rail III	ATL-TYN-53      Aluminium Rail (AL6005-T5)
	Antai Rail IV	CG-010      Aluminium Rail (AL6005-T5)
Note 6	Terrain category 2 (TC2) refers to open terrain, including grassland, with well-scattered obstructions having heights generally from 1.5 m to 5 m, with no more than two obstruction per obstructions per hectare.	
Note 7	Rail Joiner connection must placed at the fifth of the length of the interface spacing. No rail joiner should be placed at the centre of spacing or over the rail support.	
		
Note 8	For the definition of Downwind, Upwind end and middle, refer attached figure D9 from AS/NZS 1170.2-2011 Amdt 2-2012.	
Note 9	Figure 1: Shows location of the Upwind/Central & Downwind end.	
		

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 Address: **Within Australia**  
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### **Solar Roof Interface Spacing Table** **According to AS/NZS 1170.2-2011 Amdt 3-2012** **Within Australia** **Terrain Category 2**

For: Xiamen Antai New Energy Tech. Co., Ltd.



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**Project: Solar Roof Interface Spacing Table**

**Address: Within Australia**

**Australian Standards**

AS 1170. 2011 – Structural Design Actions

Part 0 – General Principles

Part 1 – Permanent imposed and other actions

Part 2 – Wind Actions

AS 1664.1 – Aluminium structures - Limit state design

**Wind Terrain Category:**

WTC3

**Designed: B.C**

**Date: Sep-15**

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 Project: **Solar Array Interface Spacing Table**  
 Address: **Within Australia**  
 Designed: **B.C**

Job: **1850**  
 Date: **Sep-15**

**Solar Array Interface spacing Table for Tile Roof**

Type of Rail                      Rail II  
 Type of Interface              ATL-FWNY-05  
 Solar Panel Dimension        2mx1m  
 Terrain category                3

Roof Angle ( $\Phi$ ) -             $\Phi < 5^\circ$

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Middle	D.W & U.W	Middle	D.W & U.W	Middle		
A	1189	1476	1021	1263	907	1120		
B	844	1041	728	895	648	796		
C	391	478	338	413	302	369		
D	245	299	212	259	190	232		

Roof Angle ( $\Phi$ ) -             $5^\circ \leq \Phi \leq 30$

Wind Region	Building Height - H (m)							
	H≤10		10<H≤15		15<H≤20			
	D.W & U.W	Middle	D.W & U.W	Middle	D.W & U.W	Middle		
A	1189	1758	1021	1500	907	1327		
B	844	1233	728	1058	648	940		
C	391	561	338	485	302	433		
D	245	350	212	303	190	271		

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 Type of Interface                ATL-FWNY-05  
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Type of Rail Rail IV  
 Type of Interface ATL-FWNY-05  
 Solar Panel Dimension 2mx1m

Terrain category 3

Roof Angle ( $\Phi$ ) -  $\Phi < 5^\circ$

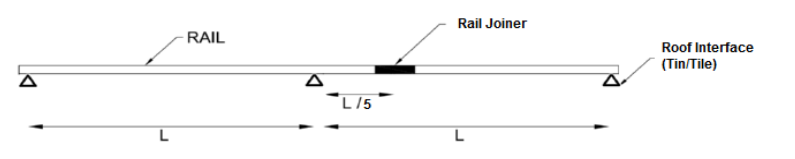
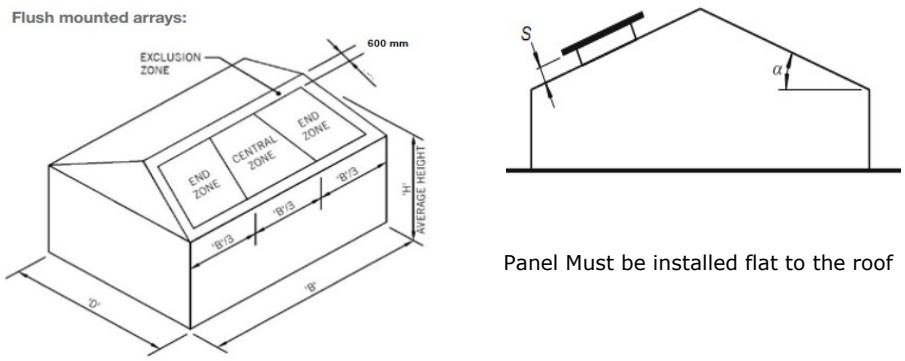
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Wind Region	Building Height - H (m)							
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	D.W & U.W	Middle		D.W & U.W	Middle		D.W & U.W	Middle
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<b>General Notes</b>		
Note 1	All holes must be pre drilled, with minimum screw embedment of 38 mm into timber.	
Note 2	The width of Timber purlins shall not be less than 38mm. Use minimum of two screws per tile hook	
Note 3	Recommended screws	
	<b>Wood purlins and Rafter</b> Pine and Hardwood (38mm embedment and above)	<b>Fasteners to use</b> 14g 10 TPI (6.3 x 65 mm long)
Note 4	Roof Tile Hook must be fixed with minimum of three 14g 10 TPI .	
Note 5	Following components are satisfied to use according to AS1170.2011	
	<b>Components</b>	<b>Part Number</b>
	L foot	ATL-TYN-hook01
	Inter Clamp	ATL-FWNY-09
	End Clamp	ALT-TYN-14
	Splice	ATL-TYN-21
	Antai Rail II	ATL-TYN-28
	T Module	ATL-TYN-29
	Antai Rail III	ATL-TYN-53
	Antai Rail IV	CG-010
		<b>Description</b>
		Tile hook Roof interface
		Internal fixing between rail and solar panel
		End fixing between rail and solar Panel
		Rail Connection
		Aluminium Rail (AL6005-T5)
		Rail to bolt connector
		Aluminium Rail (AL6005-T5)
		Aluminium Rail (AL6005-T5)
Note 6	Terrain category 3(TC3) refers to numerous closely spaced obstructions having heights generally from 3 m to 10 m. For example suburban housing or light industrial estates.	
Note 7	Rail Joiner connection must placed at the fifth of the length of the interface spacing. No rail joiner should be placed at the centre of spacing or over the rail support.	
		
Note 8	For the definition of Downwind, Upwind end and middle, refer attached figure D9 from AS/NZS 1170.2-2011 Amdt 2-2012.	
Note 9	Figure 1: Shows location of the Upwind/Central & Downwind end.	
		

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Note 10 Figure 2: National Wind Map, which shows different wind regions

